

**NORTHWEST FISHERIES SCIENCE CENTER
WEST COAST GROUNDFISH OBSERVER PROGRAM
LIMITED-ENTRY TRAWL REPORT**

September 2005

Introduction

Objective

The West Coast Groundfish Observer Program (WCGOP) collects at-sea data from limited trawl and fixed gear fleet as well as from open access nearshore, prawn, and shrimp fleets. This information is vital for determining the amount of discard and total catch of groundfish species in this region. This report summarizes discard data collected by the West Coast Groundfish Observer Program (WCGOP) from the limited-entry trawl fleet from January 2004 thru April 2005.

West Coast Groundfish Observer Program

On May 24, 2001, NOAA Fisheries (NMFS) established the WCGOP to implement the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660). This regulation requires all vessels that catch groundfish in the Exclusive Economic Zone (EEZ) to carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule making has extended NMFS's ability to require that California and Oregon vessels which only fish in the 0-3 mile zone also carry observers. The program deploys over 40 observers, depending on seasonal variation in fishing activity. These observers are stationed along the coast from Bellingham, WA to San Diego, CA.

Program Goals

The WCGOP's goal is to improve estimates of total catch and discard by observing groundfish fisheries along the west coast. Originally, the WCGOP focused observer effort in the limited-entry trawl and fixed-gear fisheries. In 2002, WCGOP started deploying observers in open access fisheries. Currently, the WCGOP coverage goal is to maintain, at minimum, 20% coverage of the limited-entry trawl fleet and fixed gear fleets. The WCGOP has continued to expand its pilot project in the open access fisheries. The observer coverage plan is available at:

<http://www.nwfsc.noaa.gov/research/division/fram/Observer/>.

The West Coast Limited-Entry Groundfish Trawl Fishery

The limited-entry groundfish trawl fishery off the west coast of the United States operates from the Canadian border to Morro Bay, California. Vessels range in size from 35 feet to 95 feet and average 65 feet. These vessels fish in both nearshore and offshore waters and deliver to shoreside processors. Trawlers often target species assemblages which results in very diverse catch. A single tow on a groundfish trawler often includes fifteen to twenty species. Fish size and total weight of catch also vary widely. Groundfish trawl vessels retain the portion of the catch that is marketable and permitted to be landed. The portion of the catch which is not marketable or which regulations prohibit landing is discarded at-sea.

Active management of the fishery began in the early 1980's with the establishment of Optimum Yields (OYs) for several managed species and trip limits for widow rockfish, the Sebastes complex, and sablefish. The objective of trip limits has been to slow the pace of landings to maintain year-round fishing, processing, and marketing opportunities. Since the 1980's, management regulations have evolved to the current use of cumulative 2-month landing limits for most species.

Fisheries managers use state-issued sales receipts (fish tickets) and vessel logbooks to monitor landings. Fish ticket and vessel logbook data are transferred to the Pacific Fisheries Information Network (PacFIN) by state fisheries agencies in Washington, Oregon, and California. Fish tickets are useful for monitoring the fishery throughout the year. Trip limit amounts may be changed throughout the year based on the fish ticket data. However, fish tickets provide information only on the amount of fish landed. In order to ensure that total catches do not exceed annual OYs, managers also need information on the discard of each species. One of the best means of acquiring accurate data needed to estimate the amount of discarded catch is through an at-sea observer program.

Methods

Vessel Selection Process

Vessels are selected for observation using stratified random sampling. Based on available effort, a selection cycle is defined by the amount of time it will take to observe the entire fleet. The selection cycle is broken into two-month periods which coincide with the two-month cumulative

trip limit period. The WCGOP aggregates ports along the west coast into port groups, which are considered strata. Vessels with limited-entry trawl permits are assigned to a port group based on previous year's landings. Within each port group, the vessels are randomly selected for coverage for each period. Once selected, vessels are observed for the entire two-month period. After the entire fleet has been selected, the selection cycle begins again. This selection process is designed to produce a logistically feasible sampling plan with a distribution of observations along the coast. Based on this design and its current level of funding, the program cycles through the limited-entry trawl fleet every eight months.

Data Collection

Fisheries observers are trained professionals who monitor and record catch data on commercial fishing vessels, following the protocols in the WCGOP Manual (NMFS, NWFSC, 2004, unpublished report).

The data collected by the observers on a trip basis include:

- Start time, end time, depth and location of tows/sets
- Gear type and fishing strategy

The data collected by the observers on a haul basis include:

- Estimated total catch weight (including tows/sets for which there is 100% discard)
- Weight of discard by catch category
- Reason for discard by catch category or species
- Species composition of discard by catch category
- Weight of fish retained by catch category
- Species composition of retained by catch category
- Estimate catch weight of prohibited species
- Record incidental takes of protected species
- Size composition, tags, and viability assessments for Pacific halibut
- Size composition of discarded fish (from randomly selected categories)
- Basic taxonomic composition of non-fish bycatch
- Biological collections (otoliths, maturity, food habits, genetic samples, etc.)

Observers use a multiple-step process to sample the catch. First, the crew separates the retained catch into catch categories. On the west coast, a catch category is a single species or a group of fish

species used to record retained catch and landings in the Pacific Fisheries Information Network (PacFIN) using a four-letter code. The estimated weight of each catch category is then recorded in the vessel logbook.

After the crew sorts the retained catch, the observer samples the remaining catch. Depending on the size and composition of the remaining catch and the time available, the observer may record the catch as one catch category or sort it into multiple catch categories to improve the sampling of rarer species. The observer records the estimated weight and species composition of each catch category and enters the data into the observer database once back on land.

Processing the Data

The WCGOP uses the following procedure to ensure that the quality of the data collected is maintained:

1. Data are collected at-sea by the observer following the protocols in the WCGOP Manual (NMFS, NWFSC, 2004, unpublished report).
2. Data are entered into the database system. The data are entered into a centralized Oracle database located at the Northwest Fisheries Science Center (NWFSC). Data within the Oracle database are accessible via the web-based GUI or by direct SQL queries to the database. A list of data tables is located in Appendix A.
3. A quality control check is run on the sampling methods and calculations. A debriefer checks all computations made by the observer and reviews the forms to ensure that it is complete and that appropriate sampling methods were used.
4. The observers are then debriefed after every two-month cumulative trip limit period. The debriefing includes:
 - a. Interview – The observer is interviewed by the debriefer.
 - b. Vessel Data - Observers complete a vessel survey for each vessel that explains vessel set-up and basic sampling methodologies.
 - c. Logbook Review - Observers keep logbooks detailing the events of each trip, basic deck schematics, sampling methods used, communication logs, and confirmation of a current safety decal. Any hauls during which sampling problems occurred are documented in the logbook and reviewed during debriefing.
 - d. Data Correction - Observer corrects all calculations and errors in data forms.

- e. Evaluation - Observers are evaluated on their performance.
5. The data in the database is then checked and updated. The electronic data are compared to the raw data for keypunch errors. Also, all corrections discovered during debriefing are updated in the database program.
6. Quality control queries are run to detect data that fall outside specified ranges and other inconsistencies between data elements.
7. The data in the database is updated. The raw data of all entries that are highlighted by the QC queries are reviewed and the electronic data is updated.
8. Finally, data are considered complete and ready for analysis and are released to the analyst.

Analysis

After the quality control, the raw data are processed and merged with fish ticket data to provide more accurate estimates of bycatch. First, the subsamples of catch categories are expanded to the entire catch category at the tow level. Second, the WCGOP data are matched to fish tickets and the observer estimates of total weights of the retained catch categories are adjusted to match the fish tickets weight, which are actual weights from the processors. Finally, the catch categories found only on the fish tickets are distributed across the tows by multiplying the weight in the catch category by the percent weight of the observed catch in each tow.

A tow-level expansion is needed to estimate the total amount retained and discarded of each species in the catch because of the sampling procedure that derives the species composition. If the species composition of a catch category is mixed, an observer may take a subsample from the catch category. The following equation is used to calculate the weight of the subsample by summing across the observed weights of the individual species:

$$w_j = \sum_i x_{ij} ,$$

where

x_{ij} = observed weight of the species i in catch category j in the subsample,

w_j = weight of the subsample from catch category j .

The sampling ratio (R_j) used to scale the subsample weights to the amount in the catch category is calculated by dividing the weight of the subsample by the total weight of the catch category using the equation:

$$R_j = w_j / y_j$$

where

y_j = the total weight of catch category j .

The tow-level expanded weight of the species i in category j which is calculated by dividing the species weight in the subsample by the sampling ratio is:

$$X_{ij} = x_{ij} / R_j$$

where

X_{ij} = the weight of species i in catch category j .

Tallying the weight (X_{ij}) of the species (i) across all categories (j) within a tow would give the total landings of the species retained or discarded.

Fish tickets are trip-aggregated sales receipts for marketable species/categories. They are used for catch monitoring and stock assessment. Fish ticket information is loaded into the PacFIN database monthly and is subject to update frequently thereafter. The WCGOP data is linked to fish tickets by either direct fish ticket number(s) obtained by the observer and by comparing the return date recorded by the observer with the dates of fish tickets from the vessel. For trips with multiple fish tickets, the fish ticket data is combined for analysis. For trips with missing fish tickets, the WCGOP data is not adjusted.

The WCGOP data is adjusted so that the total trip pounds of retained fish in a catch category (as recorded by the observer) matches the total trip pounds in the fish ticket because the fish ticket weight is often more accurate. To match the total trip pounds, the weights within each observer retained catch category are scaled up or down by the ratio of fish ticket and observer trip weights for that category, using the following equation to calculate the adjustment factor:

$$A_{jkm} = x_{jkm} / \sum_k x_{jkm}$$

where

x_{ikm} = lbs in catch category j in tow k in trip m

A_{jkm} = adjustment factor used for catch category j in tow k in trip m .

The adjusted WCGOP data is:

$$x'_{jkm} = A_{jkm} \cdot C_{jm}$$

where

C_{jm} = lbs in catch category j for trip m recorded on the fish ticket.

When a catch category in the WCGOP data cannot be matched to a fish ticket species category, the WCGOP data was not adjusted.

The catch categories only found on the fish tickets were distributed across the tows using the proportion of the observed catch per tow divided by the total observed catch per trip using the following equation:

$$B_{km} = \text{Total weight per haul} / \text{Total weight per trip} = \sum_j \sum_i x_{ijkm} / \sum_k \sum_j \sum_i x_{ijkm}$$

$$C_{jkm} = B_{mk} \cdot C_{jm}$$

where

B_{km} = the proportion of observed catch in tow k in trip m

C_{jkm} = lbs in catch category j for tow k in trip m recorded on the fish ticket.

The data analyzed included bottom trawlers using both large and small footropes. Trawlers using gear other than bottom trawl gear (mid-water gear, Danish/Scottish seine) or fishing under different regulations (exempted fishing permits (EFP permits)) are excluded from this analysis because the numbers in this report are used to manage the bottom trawl groundfish fishery. The exception is that EFP trips are included in figures 1 and 2 because separating the EFP from the non-EFP trips is not trivial. Trips from vessels with limited-entry trawl permits targeting California halibut are also excluded from this analysis.

The bycatch rates were calculated for pounds of a species discarded per hour of towing, pounds of species discarded per one-hundred pounds of groundfish retained, and one-hundred pounds of species caught per pounds of retained ground fish. The ratio estimator technique (Cochran 1977) is used to estimate bycatch and discard rates for 32 selected species or species groups (Tables 6-7). The fish species selected are the all overfished stocks, prohibited species (salmon, Pacific halibut), and the other assessed stocks. The ratio estimates (R_{ijk}) are calculated by area (i), depth range (j), and period (k):

$$R_{ijk} = \sum_t y_{ijkt} / \sum_t x_{ijkt}$$

where y_{ijkt} is the discarded or retained pounds of a species in the tow t . Three denominators (x_{ijkt}) are presented here: duration in hours of the sampled tow t , the total catches in pounds of the target species, and the total catches of all groundfish in the tow t . The first denominator is an un-standardized catch per unit effort for the area-depth-period stratum. The second and third

denominators are used to provide different perspectives for these preliminary analyses. The variance of R_{ijk} is approximated by using the following equation (Cochran 1977):

$$Var(R_{ijk}) = \frac{1}{n} \left(\frac{\bar{y}_{ijk}}{\bar{x}_{ijk}} \right)^2 \left[\frac{s^2(y_{ijkt})}{\bar{y}_{ijk}^2} + \frac{s^2(x_{ijkt})}{\bar{x}_{ijk}^2} - 2 \left(\frac{\sum_t (y_{ijkt} - \bar{y}_{ijk})(x_{ijkt} - \bar{x}_{ijk})}{\bar{y}_{ijk}^2 \bar{x}_{ijk}^2} \right) \right]$$

where \bar{x}_{ijk} , and \bar{y}_{ijk} are the means of x_{ijkt} and y_{ijkt} over the tows and $s(x_{ijkt})$ and $s(y_{ijkt})$ are the standard errors of x_{ijkt} and y_{ijkt} . Note that $Var(R_{ijk})$ cannot be calculated when $y_{ijkt} = 0$ or $x_{ijkt} = 0$ for all tows and should be used with extreme caution when is R_{ijk} equal to one. This variance estimator was chosen in place of the previously used estimator from Pikitch et al. (1998) because it does not assume independence of the numerator and denominator.

Results

Overall Coverage Levels

For 2004, the limited-entry bottom trawl trips observed by the WCGOP accounted for 27% of the coastwide tonnage landed on all bottom trawl trips including EFP trawl trips (Table 1). This coverage level was a decrease from the coverage level of the previous period, which was 29% for September 2003 to August 2004 (NMFS, NWFSC 2005, Table 1). For January thru April 2005, the tonnage landed on the observed limited-entry bottom trawl trips was 25% of the total tonnage for all limited-entry trawl trips. While the early 2005 coverage level was a decrease from the coverage level of the previous period, it equals the expected coverage level for a sampling design that selects the entire fleet for observer coverage in four 2-month periods.

Spatial Distribution of Observations

In general, the 2004 coverage levels (Table 1) of the limited-entry trawl fleet were similar to the levels in the previous period (NMFS, NWFSC 2005, Table 1). The largest changes in coverage levels were Neah Bay (30% to 36%) and Newport (32% to 23%). The coverage levels are subject to variation. WCGOP can control the number of boats observed, but not the amount of fish landed on these boats. The coverage levels will fluctuate as a function of the amount of fish landed in a

fishery and the amount of fish landed on the vessels observed. Only Morro Bay had less than 20% coverage in 2004, but this is probably not significant because the Morro Bay port group accounted for only 4% of the trawl fleet landings. There are very few trawl landings made in southern California (Los Angeles and Santa Barbara port groups). These landings accounted for just 0.02% of the fleet groundfish tonnage during 2004. In 2005, the coverage levels (Table 1) vary quite a bit along the coast which is not a surprising given the small number of trips covered in some of the port groups (Table 2) and that coverage estimates only encompassed four months as opposed to an entire year. The small number of trips makes the metric tons observed sensitive to the effort and success of the individual fishing vessels and trips.

Table 2 reports the number of trips observed within each port group during each 2-month period. At this level of detail, the highly variable nature of observer coverage is revealed. Not only does the number of observed trips vary dramatically throughout the year within a port group, but so does that group's share of the coastwide total observed trips. Several factors contribute to this variability: weather-related impacts on fishing activity; the regional importance of seasonal alternative fisheries, such as shrimp and crab; regional differences in trip limits; and differences in the number and characteristics of vessels between port groups.

Plots summarizing the distribution of all limited-entry bottom tows recorded in state logbooks and tows observed are presented for three sections of the coast in Figures 1a-c. For these figures, tows were assigned to a 10 km by 10 km grid block based on the starting location of the tow. The shading of each block reflects the number of logbook tows, with darker shading indicating more tows. The circles overlaid on each block reflect the number of observed tows, with larger circles indicating more tows. Blocks with the darkest shading and the smallest circles indicate fishing locations that received relatively less observer coverage.

Figure 1a depicts the portion of the coast north of Coos Bay, Oregon in 2004. In this area, 54 blocks had more than 50 logbook tows. Of these, 43 had at least 16 observed tows, and only two had fewer than 4 observed tows. Nine blocks with more than 10 logbook tows had no observed tows. Figure 1b shows the area from Coos Bay south to just north of San Francisco, California in 2004. During 2004, there were only two blocks in this area that had more than 50 logbook tows, and each had more than 15 observed tows. Four blocks with 11 to 50 logbook tows had no

observed tows. Table 1c shows the remainder of California, as far south as Santa Barbara in 2004. This area had 17 blocks with more than 50 logbook tows. All of these blocks had at least four observed tows, and seven of these blocks had more than 15 observed tows. There were twelve blocks that had between 11 and 50 logbook tows and no observed tows. Six of these blocks were in the general vicinity of San Francisco, two just south of Morro Bay, and four near Santa Barbara. Within each of these areas, and for the coast as a whole, the spatial distribution of limited-entry trawl tows appears to have been generally well sampled by observers during 2004.

The distribution of fleet and observed tows can also be examined in terms of latitude and depth, as depicted in Figures 2a-2c. Figure 2a shows fleet and observed tow locations from the third year of observation. The vertical lines at 150 fm and 75 fm provide reference points for evaluating the effect of the trawl Rockfish Conservation Area (RCA) on fishing location. The effect of the RCA is apparent from lack of tows between depths of 75 and 150 fm (Figure 2).

Table 3 summarizes the depth distribution of observed tows by area and two-month period. For this report, north is defined as north of 40° 10' N. latitude and south as south of 40° 10' N. latitude. To correspond with regulation changes that allow selective flatfish gear in shoreward of the RCA north of 40° 10' N. latitude, the selective flatfish gear was analyzed separately from the regular groundfish trawl tows in the north in 2005. All other trawl gear in the north and all trawl gear in the south are referred to as groundfish trawl gear in this report and in the tables.

Discard Estimates

Fish tickets could not be found for 10 of the 601 observed trips in 2004 and for 2 of the 189 observed trips in 2005. Additionally, in 2004, 10 trips had tows where insufficient species data was collected because of sampling difficulties, such as rough weather or observer illness, which meant that the retained catch could not be adjusted to match fish ticket data.

In addition, a number of species assessed this year had very little or no observed discard in groundfish tows. Therefore, these species were not incorporated into the bycatch tables. Kelp greenling was observed in five tows for a total of 37 lbs from 3 tows in the northern area at less than 75 fm and 2 lbs from 2 tows in the southern area at less than 75 fm in 2005. Cabezon was observed in only one tow with only 14lbs of fish in the northern area at less than 75 fm. Vermillion rockfish

was observed in seven tows with a total of 24 lbs in the southern area, primarily in depths greater than 150 fm. No Gopher Rockfish or California scorpionfish were observed in groundfish tows.

Amounts of discarded and retained catches for 26 species or species groups of groundfish are provided in Table 4. This table also summarizes the distribution of observed discarded and retained fish by depth and the disposition of each species within a depth category. The data are categorized by area and depth zone. Table 5 provides comparable information for California halibut, Pacific halibut, and salmon species. No sockeye or pink salmon were observed in any of the tows.

Three different ratio estimators for discard of 32 groundfish and non-groundfish species or species groups are presented in Table 6. The three estimators are (1) discard per hour towed, (2) discard per one-hundred pounds of retained groundfish, and (3) discard of each species/group per pound of its own catch. Standard errors are also reported for each of these ratios. These results are summarized by area, depth zone, and 2-month period. Periods with insufficient data for estimation were pooled. In 2005, the northern estimates were also estimated by selective flatfish trawl and groundfish trawl. There was insufficient data to estimate ratios for tows with selective flatfish trawl in greater than 150 fm and groundfish trawl in less than 150 fm in 2005.

In many area-depth-period strata, the number of observed tows was very small (Table 3). The following area-depth-period combinations had a small number of observed tows and were pooled: all periods depths between 75 and 150 fm in 2004, periods one and two for depths less than 75 fm, periods one and two for selective flatfish gear in 75 to 150 fm in the north in 2005, and periods four and five in the south for depths less than 75 fm in 2004. Also, for the 2005 data, results are only reported for tows at depths less than 150 fm with selective flatfish and for tows at depths greater than 150 fm with groundfish trawl because of small sample size. In 2004, no tows were observed in period 6 for depths less than 150 fm. As a rule, rates of discard calculated relative to hours towed and retained groundfish exhibit the same direction of change across strata, however the magnitudes of change are not proportional. There is no consistent relationship between the percentage of a species that is discarded and the other two measures.

The vast majority of tows had no discard of the following overfished species: bocaccio rockfish, canary rockfish, cowcod rockfish, darkblotched rockfish, Pacific ocean perch, widow rockfish, and

yelloweye rockfish (Figure 3). Seventy-four percent of the tows had no discard of lingcod. For example, only 11 out of 690 observed tows south of 40°10' N. latitude discarded any cowcod (Figure 3). For canary rockfish, darkblotched rockfish, and Pacific ocean perch, most tows had less than 30 pounds of discard. Nine percent of the tows had more than 30 pounds of discarded lingcod. In a few cases (3% of tows), more than 140 pounds of lingcod were discarded. The tows with the largest amounts of darkblotched rockfish and lingcod discard were widely dispersed among strata (Table 4). Pacific ocean perch was primarily caught and discarded north of 40°10' N. latitude. For bocaccio rockfish, widow rockfish, and canary rockfish, nearly all tows had less than 30 pounds of discard, but each species had five to six tows with more than 150 pounds of discard (Figures 3a, b, and d). These few tows with larger discards accounted for a substantial share of discarded pounds. The extreme values of a few observations can result in standard errors for the ratio estimators that are large, relative to the ratios themselves.

For each of eight overfished species, Table 7 reports the ratio estimate and standard error of total bycatch (discarded plus retained pounds) per one hundred pound of groundfish landed, for each area, depth zone, and 2-month period. For area-depth-period strata with insufficient numbers of tows, the periods were pooled. The method of calculating these bycatch ratios is very similar to that employed in developing parameters for the trawl bycatch model used by the Pacific Fisheries Management Council for management of the fishery. These bycatch rates are calculated using total retained groundfish as the denominator. The denominator used to calculate the rates in the bycatch model equals the sum of landed flatfish, thornyheads, sablefish, and slope rockfish.

In Table 8, the bycatch rates for each species from Table 7 are presented along with the rates from the previous reports. Throughout the coast, very little trawling occurred between 75 and 150 fm, so changes in bycatch rates from previous years in that depth stratum are less significant than in the deeper and shallower strata.

For the species that are commonly found on the shelf in the area south of 40°10' N. latitude, bycatch rates in depths less than 75 fm increased in 2004. Bycatch rates of bocaccio rockfish, canary rockfish, and lingcod increased in this stratum. However, the bycatch rate of cowcod has decreased south of 40°10' N. latitude in depths less than 75 fm. In part these increases are likely the result of changes in the shoreward RCA boundary between 2003 and 2004. Also, as stocks rebuild, the

bycatch rates are expected to increase. In 2003, trawling in this area was constrained to depths shallower than 50-60 fm, whereas trawling was allowed out to 75 fm during 2004. This change allowed flatfish trawling to occur in depths that contain higher densities of these four species. For bocaccio rockfish and lingcod, it is also possible that recruitment events and/or increases in biomass contributed to the higher bycatch rates. Bycatch rates for widow rockfish in the southern shallow depths have remained at very low levels.

In the area North of 40°10' N. latitude, bycatch rates for canary rockfish, lingcod, widow rockfish, and yelloweye rockfish all declined or remained relatively constant in depths less than 75 fm since the third year of observation. Bycatch of POP in the north remained roughly the same in the depths greater than 150 fm. The bycatch rate for darkblotched decreased in depths greater than 75 fm. Bycatch of darkblotched in depths less than 75 fm also increased. On the positive side, the percentage of darkblotched catch discarded continued to decline from the third year of observation. Overall, 18% of the observed darkblotched were discarded in 2004 (Table 4), compared to 25% in Year 3 (NMFS, NWFSC 2005, Table 4).

Discussion

The data that are presented in this document reflect only the discards and bycatch on observed trips. The estimation of total amounts of discard or bycatch requires combining rates from these observed trips with fleet-wide effort data. Although important for management, such estimates are beyond the scope of this data report, but are calculated via a bycatch model used by the Groundfish Management Team (GMT). With regard to the distribution of observer coverage, it is important to note that WCGOP controls only the selection of vessels. The program does not have control or influence over where, when, or for what species the selected vessels choose to fish. Where port groups have diverse trawl vessels and dynamic seasonal opportunities for groundfish and non-groundfish species, the percentage of tonnage observed, and the spatial distribution of coverage may vary greatly within and between years. However, in the future, if patterns in vessel activity emerge, the coverage levels can be influenced through the adaptation of vessel sampling protocols.

Continuing Unresolved Data Issues

Accurate calculation of bycatch rates requires linking observer discard estimates to a database that includes official weights for species measured at the time of landing. Without the database, the observers must rely on the hailed weights, which are usually an estimate. The two principal sources of landings data are fish tickets and logbooks that have been adjusted using fish tickets. It remains difficult to match WCGOP data with fish tickets and the logbooks, due to differences in data protocols among the states of Washington, Oregon, and California, and between the states and the WCGOP.

Since the catch categories on the fish tickets are recorded only at the trip level distributing landed weight across tows is inevitably imprecise when tow specific WCGOP data is unavailable. This is particularly true when a trip contains tows from several different depth zones. While the current approach is to distribute these landings in proportion to each tow's percentage of the trip's total retained groundfish, future work will evaluate the incorporation of additional information that may improve these assignments. For catch categories that exist in both fish ticket and WCGOP records, this uncertainty in assigning poundage differences between observed trip retained weights and their corresponding fish tickets is reduced, although not eliminated, by knowledge of the pattern of hailed catches throughout the trip.

Each of the states employs different procedures for using fish ticket landings to adjust logbook retained catches (Sampson and Crone, 1997; Pearson and Erwin, 1997; Clark, 1986a, 1986b, 1988a, 1988b). Linking WCGOP records with corresponding logbook tow data is often difficult and time-consuming, due to the inconsistent adjustment protocols and other factors such as: i) Incomplete logbook submission; ii) A significant number of logbook trips where tows are not recorded in chronological order; iii) The absence of some tows in logbooks, especially where no groundfish are retained; and iv) Inaccurate recording of tow locations, depth, and date. If these issues were resolved, the analysis of WCGOP data could be more comprehensive and timely.

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Appendix A. Oracle Database

Database Table Hierarchy

TRIPS

- ▶ FISHING_ACTIVITIES
 - ▶ FISHING_LOCATIONS
 - ▶ CATCHES
 - ▶ SPECIES COMPOSITION
 - ▶ SPECIES_COMPOSITION_ITEMS
 - ▶ BIO_SPECIMENS
 - ▶ BIO_SPECIMEN_ITEMS
 - ▶ DISSECTIONS

Database Table Descriptions

The database tables listed in the table below are a subset of the total tables contained in the Oracle database. They represent the tables that are actually used to contain the WCGOP data collected by the WCGOP.

BIO_SPECIMENS	Sets of species physical measurements resulting from sampling catches occurring in a tow or set
BIO_SPECIMEN_ITEMS	Physical measurements collected for an individual fish, mammal or bird occurring in a biological sample
CATCHES	PacFIN catch category based on estimates of fish caught during a tow or set
CATCH_CATEGORIES	PacFIN catch categories
DISSECTIONS	Physical specimens collected for an individual fish, mammal or bird
FISHING_ACTIVITIES	Fishing tows or sets occurring during a trip
FISHING_LOCATIONS	Locations of tows or sets
PORTS	Coastal cities where fishing activity is based out of
SPECIES	Fish, mammal, and bird species that might be encountered during fishing
SPECIES_COMPOSITIONS	Sets of species weights and counts resulting from sampling catches occurring in a tow or set
SPECIES_COMPOSITIONS_ITEMS	Weights and counts for individual species occurring in a species composition sample
TRIPS	Sets of fishing activities that occur between the time a vessel leaves port and when it returns
VESSELS	Trawl, longline, pot, or other fishing vessels